In the matter of

US Patent Application No. 10/564,881

In the name of Abrar Jawaid

Assigned to FIRA International Limited

INVENTOR'S DECLARATION

1. I, Abrar Jawaid of 37 Plumian Way, Balsham, Cambridge, United Kingdom am named as Inventor on International patent application no. PCT/GB04/03134 which has entered the US national phase as United States patent application no. 10/564,881.

2. I hold both Bachelors and Masters degrees in Biochemical Engineering from Swansea University, a Bachelors degree in Science (Environmental) from the Open University and a PhD entitled "The Decortication of Flax by the Application of Hydroacoustic Radiation. At the time the invention was made I was employed by the Patent assignee, FIRA International Limited in the role of research project manager. I am currently employed by FIRA International Limited as Achor Innovation Ltd as Biochemical and Environmental Process Manager.

3. I confirm that I have read the patent application for the present invention and am familiar with its content. I also confirm that I have read the relevant prior art which has been cited by the Examiner in the present case: United States Patent No. 5,804,035 (hereinafter Michanickl) International Patent Application No. PCT/US02/36443 (hereinafter Akhtar) and United States Patent 4,000,032 (hereinafter Bergstrom). I have also read the extracts from "Chemical Pulping" by Gullichsen and "Handbook for Pulp and Paper Technologists" by Smook which were cited by the Examiner in the Office Action of September 15, 2008. I have reviewed this Office Action.

4. The Examiner asserts that "applicant fails to argue why a person of ordinary skill in art would not expect the lignocellulosic fibre material of Michanickl to have increased porosity and therefore increase impregnation under the microwave treatment of Akhtar". In addition, the Examiner asserts that there is a *prima facie* motivation to combine the teaching of Akhtar and Michanickl. Furthermore, the Examiner asserts that, contrary to the applicant's position, "the broadest reasonable interpretation of the claims could extend to a soft wood two-by-four

board which has lignocellulosic elements bonded together by adhesive lignin". This interpretation is based on the assertion that "lignin is known as the glue that holds wood fibres together".

5. Wood is a highly complex and ordered material at the chemical level, as well as the microscopic and visible levels. Plant cell walls that are present in unprocessed wood are made from millions of cellulose fibres (also known as microfibrils) in combination with other plant polysaccharides, such as hemi-cellulose and pectin, along with lignin. The individual cells in wood tissue are arranged in order to allow water to flow within the plant. To further promote the movement of water within the living tree, wood also comprises structures known as "pits". These are found in the individual plant cell walls and regulate the movement of water from one adjacent cell to the next, and thus throughout the wood tissue as a whole. Pits are also complex structures which can open and close in response to physiological stimuli in a living plant. Thus, wood comprises a network of natural channels and passages which are linked together by pits.

6. Lignin is a natural biopolymer which is present within wood as an intrinsic component of the plant cell walls (rather than as an extrinsic adhesive). Lignin covalently binds and cross-links other components within cell walls. One role of lignin is therefore to provide mechanical strength by cross-linking other cell wall components.

7. At page A26, Gullichsen refers to lignin specifically stating:

lignin, the "glue" of wood, is a very complex three dimensional network polymer

8. The use of quotation marks by Gullichsen serves to indicate that that the term "glue" is not intended to be understood literally. Instead, it appears that Gullichsen intends to use the term "glue" figuratively, i.e. as a reference to the role of lignin within wood, rather than as an indication that lignin is actually a glue in the literal sense.

9. The term "board material" is a term of the art and in this context would be understood to refer specifically to a processed, composite material. In other words, a composite which has been derived from smaller chips, fragments, fibres and/or particles of wood which have been bonded together artificially using, for example a man-made glue (such as, for example, a polyurethane, urea formaldehyde, melamine-urea, isocyanate or phenolic resin). This definition is in accordance with the discussion in paragraph 2 of the present application. Thus, when contemplating "a matrix of adhesively bonded lignocellulosic elements" as

defined in the claims, a person of ordinary skill would not consider lignin to be "an adhesive", but rather to be a structural component of the lignocellulosic elements.

10. In the present context, a "lignocellulosic element" would be understood to be a fragment of wood tissue, such as a wood fibre. At the chemical level, wood is a complex material comprising fibres of cellulose and other polysaccharides crosslinked by lignin. Gullichsen provides some example data in Figure 3 on page A21 and in table 3 on page A28. These fibres were originally laid down as components of the plant cell walls in the tree.

11. The lignocellulosic elements of a board material as claimed thus comprise, by definition, both lignin and cellulose. The wood-derived components present in a man-made composite board material are bound together, not by lignin, but by a man-made adhesive, such as a resin, that is added during the manufacture of the board. Typically, the wood fibres etc. are linked together by the curing of resin droplets, which would ideally be distributed throughout the wood fibres etc. as evenly as possible. The droplets of resin link the fibres together and form a bond when hot pressed. Individual wood fibres etc. overlay each other in a random manner and where a droplet of resin exists a bond is formed. In contrast to unprocessed wood, board materials are thus highly homogenous and do not retain the internal structure and complexity that characterises unprocessed wood.

12. For these reasons, the skilled person would understand the term "board material" to refer to a man-made composite material comprising wood derived fragments such as fibres (i.e. lignocellulosic elements) which have been bonded together by means of an adhesive which was added as part of the manufacturing process. Thus, it is not reasonable to give so broad a definition of the claimed term as to cover simple unprocessed planks of wood which do not comprise an additional adhesive, such as a resin. This may however be a moot point in the light of the clarifying amendment (to specify a "composite board material") which I understand is to be offered to the claims.

13. As noted by the Examiner, at paragraph 38, Akhtar describes how steam pressure generated inside the wood, under the influence of microwave treatment, can destroy pit membranes and vessel cell walls, increasing porosity and permeability. The highly ordered and organized structure of unprocessed wood itself would be expected to enhance this process. For example, steam pressure build up within the wood cells responsible for the conduction of water would be expected to be transmitted through the wood (in a manner analogous to the transportation of water during the life of the tree). Thus, the complex internal structure of the wood would be expected to help the steam penetrate into the wood and promote its disruption and breakdown. However, the homogeneity of a board material

would not be expected to assist in this process. The lack of an intact network of vessels, interconnected by pits, would be expected to result in a lack of steam pressure build up and subsequent transmission into the material. Owing to the fact that composite board material and natural wood are so internally structurally different, at a minimum, as one skilled in the art, I do not consider the behavior of natural wood under certain circumstances to provide guidance as to the behavior of composite board material under such circumstances.

14. For the above reasons, a person of ordinary skill in the art would not regard the teaching of a prior art document directed to a method of pulping wood logs (such as Akhtar) to be relevant to a method for the recovery of lignocellulosic elements from a processed material such as a composite board material. Thus there would have been no case to combine Akhtar (which teaches that steam pressure in wood vessels will increase porosity and permeability) with Michanickl (which teaches impregnation of fibre material). This is in addition to the fact that Akhtar is directed to methods which aim to minimise the content of lignin in the final material, whereas the presently claimed method is intended to preserve the lignocellulosic elements from the source board material. Thus, not only is there no case to combine the documents, but also there would be no expectation that the combination would be advantageous.

15. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed by:

A. Jawaid

Abrar Jawaid

9/12/08

Date

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